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Interactive comment on "Augmented Kalman filter with a reduced mechanical model to estimate tower loads on an onshore wind turbine: a digital twin concept" *by* Emmanuel Branlard et al.

Anonymous Referee #2

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This paper presents: *An application of the Kalman filtering technique to estimate tower-base loads on a wind turbine using readily available measurements and a simple 2-DOF model, e.g., for use as a digital twin. *Validation of the method using OpenFAST simulations for a land-based wind turbine. *Recommendations for future work in this area.

Overall, the paper is well written, the results appear to be scientifically sound, and the results are informative. A few corrections and clarifications are warranted to approve the final publication. Please find specific comments and technical corrections below:

Specific Comments (Page / Line / Comment): 3 / 67 / Do the stiffness and damping

account for aerodynamic stiffness and damping, or just structural? I.e. do the aerodynamic stiffness and damping come from T_a* or through C and K. 6 / 152 / The matrix "P"_u" should not be premultiplied by Mˆ-1. 6 / 154 / Why is Y_qdd included? As indicated next, qdd can be derived from qd, q, p, and u, so, including Y_qdd is redundant; the acceleration-related terms can be captured directly within Y_qd, Y_q, Y_p, and Y_u. 9 / 212 / Figure 2b is a bit hard to understand and could be clarified a bit more in the text. 11 / 258 / Is there a reason the inertia of the RNA is not accounted for in the model, i.e. a M_RNA*qdd_t term?

Technical Corrections (Page / Line / Comment): 2 / 21 / Change "extended" to "extending" 2 / 39 / Change "approach" to "approaches" 2 / 43 / Add a period at the end of the sentence. 5 / 119 / Change "X_y" to "X_u". 5 / 122 / Presumably "t" represents a transpose? Please clarify. 7 / 160 / Change "X_x_d" to "X_x,d". 12 / 288 / Do you mean Q and R matrices, as used in section 2.3? 14 / 310 / Change "quantifies" to quantified".

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